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Development of generic no-scale inflation

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We develop generalized no-scale supergravity models of inflation, and then study the corresponding cosmological predictions as well as the formation of primordial black holes (PBHs) and scalar-induced gravitational waves (SIGWs). With a new parameter a, the generalized no-scale supergravity provides the continuous connections among the generic no-scale supergravity from string theory compactifications. The resulting prediction of the CMB, spectrum index n_s, and tensor-to-scalar ratio r can be highly consistent with the latest Planck/BICEP/Keck Array observations. Notably, the models with $a \neq 1$ give a smaller ratio $r \leq 10^{-3}$, which is flexible even under the anticipated tighter observational constraints at the future experiments. Additionally, these models have the potential to generate a broad-band stochastic gravitational wave background, and thus explain the NANOGrav 15yr signal. Furthermore, they predict the formation of PBHs with various mass scales, which could account for a significant portion of dark matter relic density in the Universe.

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